

Report of TWG Activities for FY 1998-1999

Paul Zschack, TWG Chairperson

Executive Summary

The TWG remains a vital and important vehicle for sharing technical information among the CATS and between the APS and the CAT community. The monthly meeting format provides a timely, informal forum for direct discussion and debate of important technical issues. The mission of the group continues to encompass information exchange, identification of common concerns and issues requiring CAT or APS responses, resource sharing and exchange, and focused technical collaboration involving CAT and APS expertise on CAT-common issues. The TWG also serves as the primary conduit between the CATs and the APS for technical information exchange.

During the last year, the TWG agenda has been set to emphasize technical rather than policy issues. Recommendations that emerge from the TWG or its subgroups should be viewed with this perspective.

The TWG also remains non-specific as regards to scientific discipline. Effort was made to be inclusive and not exclude segments of the APS user community. It is clear that there is sufficient overlap on common technical issues and instrumentation that the TWG can remain viable without emphasis on the scientific output of each CAT.

In addition to monthly meetings, subgroups have been formed to study specific issues in greater detail. The subgroup approach has been successfully employed by the TWG in the past, and continues to work well to bring interested members together to focus on specific tasks or topics. Active subgroups during the year included *Top-off Operations*, *Storage Ring Operation Modes*, *Beam Stability*, *Detectors*, and *Beamline Diagnostics*.

Steve Heald (PNC-CAT) will be the TWG chairman for FY 1999-2000, while Mark Beno (BESSRC-CAT) serves as chair-elect and will lead the group for FY 2000-2001.

Monthly Meeting Summary

The TWG has chosen monthly meetings format and meets the third Thursday of each month. Minutes from each meeting can be found on the TWG homepage and are thus not included with this report. The monthly meetings generally include an update from the APS, APS Reports, and CAT Reports. Important topics covered throughout the year included the liquid nitrogen distribution system and white-beam slit corrosion problems. A listing of reports and presentations for the year is attached.

Periodic CAT activity updates serve to inform the community of the progress that each sector is making and provide an important information-sharing dialog. Only one CAT declined the opportunity to provide a CAT sector update when asked; there is a general willingness demonstrated on the part of the community to share their experiences with the other CAT groups.

At the monthly meeting, the attendance was typically 30-35 individuals representing many CAT groups and the APS. Certain sectors were faithfully represented every month, while several others rarely participated. The APS is generally well represented and available for discussion and meaningful dialog.

Active Subgroup Efforts

Timing & Accelerator Parameters Subgroup (Storage ring operations subgroup) – J. Tischler

This subgroup met for the first time since 1996 to revisit accelerator parameters and timing issues. Several types of timing requirements and filling patterns were discussed.

Recommendations from this subgroup have been issued and are included with this report.

This subgroup has decided to meet only as necessary.

Top-off Subgroup – J. Quintana

This subgroup was formed to examine the technical issues surrounding top-off mode and its implementation. The subgroup is comprised of members of several CAT groups, ASD, and XFD. Specific input has been provided to ASD regarding the beam perturbation during top-off injection. It was decided that useful and meaningful beamline studies couldn't be performed until the effect of the injection perturbation is reduced to about 10-15%. At that time, studies will be coordinated through this subgroup to examine the impact of top-off injection on data collection for various experimental protocols. Other details concerning specific gate signals etc have been worked out through this group. Meetings will recommence once beam perturbation is reduced and as required thereafter.

Beam Stability Subgroup – P. Zschack

Formed at the request of the Research Directorate, this subgroup met several times between June and October 1999. The subgroup includes CAT members, and ASD & XFD personnel. From the relatively poor turnout by CAT groups, one must conclude that the storage ring performs very well for most experimental programs. Nonetheless, there are a few groups that continue to be sensitive to orbit stability. Efforts to understand these issues have presented the opportunity for joint ASD-user studies, which have been exploited. This continued cooperation benefits both the user community and ASD.

The need for local feedback was re-emphasized. Hope is currently placed in x-ray BPM usage for local feedback control, and early experiences with sector 14 are very encouraging.

The deputy ALD for the APS has asked that the user community consider whether new specs are required for the orbit stability of the storage ring. This should also consider the frequency domain or power spectrum. Details are forthcoming from the UP Division director, and this subgroup will coordinate the user response. Subgroup meetings are expected to continue at approx. 2-3 month intervals, or as required.

Detector Subgroup – T. Irving

Detectors are recognized as a critical area impacting many experimental programs and of common interest. This subgroup has formed to share information and resources, and to formulate recommendations regarding detector issues. Possible roles for the APS have been explored including discussions of an APS maintained detector pool.

Diagnostics Subgroup – J. Lang

All beamlines face the problem of troubleshooting and characterizing optics performance. This subgroup was formed to share information and further explore common requirements of beamline diagnostics, ranging from permanent in-line tools to one-time characterization techniques. A survey of currently used methods is underway.

Topics & Presentations

Facility Reports

APS facility update/news (monthly)
LN2 distribution system update (monthly)
External corrosion causing W-slit water leak
Radiation measurements at the APS & ESRF
Top-off operations
Beam stability issues
New standard component designs
XFD services (LN2 & DI H2O)
W slit - DI water interactions

S. Davey
B. Ferry
D. Shu
P.K. Job
T. Rauchas
T. Rauchas
D. Shu
M. Ramanathan
T. Kuzay

CAT Reports

The first three years of instrumentation
 experience at the high-energy resolution
 x-ray scattering beamline of the SRI-CAT
UNI-CAT sector 34 activity update
Double-undulator heat-load studies revisited
Fast x-ray measurements on diesel fuel spray
Beamline Diagnostics Subgroup report
Detector Subgroup report
Power recovery issues
 (coolers, computers, servos, vacuum, etc..)
SAXS at BESSRC-CAT
SAXS at IMM-CAT
SAXS at Bio-CAT
MX: A portable data acquisition & control toolkit
BIOCARS-CAT activity update
Beamline diagnostic monitor
UNI-CAT cryocooler failure
Emerging microbeam optics & studies
Fast chopper for timing applications
Inexpensive kinematic mounting devices
Double-undulator heat load studies
CMC-CAT activity update
Accelerator Parameter Subgroup report
Real-time computed microtomography
In-vacuum beam intensity monitor
BESSRC-CAT activity update
COM-CAT activity update
SRI-CAT sector 4 activity update
Newport Kappa goniometer performance
PNC-CAT activity update
Discussion items - Top-off studies

E. Alp
I. Robinson
W-K. Lee
J. Wang
J. Lang
T. Irving

S. Heald
S. Seifert
L. Lurio
T. Irving
B. Lavender
R. Pahl
R. Alkire
P. Zschack
G. Ice
A. McPherson
J. Quintana
W-K. Lee
T. Gog
J. Tischler
Ian McNulty
J. Tischler
M. Beno
K. D'Amico
G. Srajer
P. Eng
S. Heald
J. Quintana

CAT Activity Updates 1998 (CAT & Sector #)

DND	5
IMM	8
GSE-CARS	13
IMCA	17
PNC	20
UNICAT	33, 34
ASD	35

CAT Activity Updates 1999 (CAT & Sector #)

SRI	3, 4
CMC	9
BESSRC	11, 12
BIO-CARS	14
COM	32
UNICAT	34

March 11, 1999 Meeting of the Timing & Accelerator Parameters Subgroup of the InterCAT TWG

Jon Tischler, Subgroup Leader

Present: Ercan Alp, Dale Brewe, Eric Dufresne, Mati Meron, Dennis Mills, Reinhard Pahl, Wolfgang Sturhahn, Jon Tischler, and Paul Zschack

There were three main types of time-resolved experiments discussed:

- 1) Need for current in one (single) bunch (not a sextuple). These bunches do not need 1 microsecond separation; >100 ns is sufficient. This was primarily for the nuclear resonant scattering experiments and laser melting experiments.
- 2) Need for a single isolated bunch. Requires a bunch with approximately 1 microsecond clear both before and after. This was primarily for use with a fast shutter to bring just ONE pulse of x-rays onto an experiment. Notes on this: this is the worst possible fill pattern for time correlation spectroscopy, some "single bunch" experiments could use an isolated triplet (but not most). This was primarily for the fast snapshot crystallography and the other "chopper" experiments.
- 3) Photon correlation spectroscopy prefers DC (now not a problem). The current fill pattern is close enough for them. Right now the count rate in this type of experiment is too low to see the current time structure.

Not considered were "time evolved" experiments (time resolution > 10 microseconds). These just need intense powerful beams. Additionally, atomic time-of-flight measurements were not considered either.

Issues:

Bunch purity (currently clean down to 10^4 - 10^5). Without the PAR, will it stay this good?

What is the emittance and coupling? There are posted numbers and a PV is available to SRI-CAT. How accurate are these and what are the day to day variations? Is a live indicator possible?

Dead-time correction in fast detectors and dependence on filling pattern. (Dealt with.)

More special operations mode shifts? (Currently, there is one week of special operations mode (SOM) at the end of each six-week running period). Could the standard operation mode change from triplets to singlets?

ASD appears to be working on the important issues with respect to timing experiments.

Recommendations:

There was widespread sentiment for making the singlet mode the standard mode (if workable) and reserving the SOM shifts for time structures that are more special. It was recognized that this might have to wait until the implementation of a top-off mode.